

name could take. On the same page the unwarranted liberty is taken of docking another such word; and elsewhere the Greek origin of *Saccamina* is falsified in "Saccamina."

Doubtless this is a well-devised handbook, and, though limited by conciseness of method, both in choice of typical fossils and in treatment, it will be useful to students as a suggestive and trustworthy guide in palæontology, especially as to the most probable subjects to be taken up in examinations.

MISCELLANEOUS.

Cucumaria Montagu (Fleming) and its *Synonymy*.

By the Rev. Canon A. M. NORMAN, M.A., D.C.L., F.R.S., &c.

Cucumaria Montagu (Fleming).

1808. *Holothuria pentactes*, var., Montagu, Linn. Trans. vol. ix. p. 112, pl. vii. fig. 4.

1823. *Holothuria Montagu*, Fleming, Hist. Brit. Anim. p. 483.

1882. *Cucumaria Lefevri*, Th. Barrois, Cat. des Crust. Podoph. et Echin. à Concarneau, p. 52, pl. ii. figs. 1-8.

1889. *Semperia Drummondii*, Hérouard, Rec. sur les Holothuries des côtes de France, p. 683, pl. xxxi. D. figs. 1-10, figuræ bonæ (nec *Holothuria Drummondii*, Thompson).

Colour whitish, or often deep purple above and whitish below; tentacles always deep purple. Length of my largest specimen (A) is a little over $2\frac{1}{2}$ inches, but the body is in an extreme state of contraction, and when alive probably the animal would have been 4 to 5 inches. Specimen B is also $2\frac{1}{2}$ inches long, but scarcely one fourth the circumference of the last, being fully expanded in length. I now proceed to give an account of spicula of these and of a young specimen.

Specimen A.—Body-spicule ovate, with indented margin, having four foramina, one foramen (oval) on each side and one (round) at each end of a central bar; a surface-nodule at each end of the bar itself, and ten (rarely twelve) nodules on the margin of the spicule. Upper small body-spicule campanulate; height of bell greater than or subequal to the breadth, upper portion of bell formed of four ribs which arch down from the extremities of a very short central bar; near the mouth of the bell the ribs divide into two branches, which, inclining right and left, unite with the branches coming from their neighbours, and, just prior to their union, each branch throws out downwards a little nodulous spur, so that the bell rests, as it were, on eight little legs. This is the description of the type; but slight irregularities of growth often present themselves.

Pedicels of feet surrounded with flattened strap-shaped spicules, generally arcuate, sometimes slightly dilated in breadth in the middle, or at this part throwing out a lobe; the spicule is perforated with a few foramina, which, except in the case where the spicule is dilated centrally, are usually arranged in single file. Terminal plate not observed in this specimen.

Tentacle-spicules: the larger very like in general character to those of the pedicels, but often a little expanded at the extremities and bearing in that part three or more foramina; other spicules are cribriform, often elongate, more generally very irregular in form; the smallest of these, which clothe the extremities of the ramifications of the tentacle, are very delicate in their structure.

Specimen B.—Body-spicule like that of A, but only a spicule here and there showing any nodulous growth, the vast majority presenting a perfectly smooth surface; nor are they so universally confined to the number of four foramina, the spicules often having an additional foramen at each end (*i. e.* four in a direct central longitudinal line); among them were also very many in an early stage of growth, spectacle-formed, two foramina being united by the central bar. No bell-shaped spicules have been found in this specimen, though they have been thoroughly sought for. Pedicels with lateral spicules, some just as in A, but here more generally with about three small foramina at each end; termination of pedicel with an arborescent delicate cribriform plate in the centre, and at the edges several much stouter cribriform plates of irregular outline (it is possible that these disunited plates ultimately coalesce into one cap). Tentacle-spicules as in A.

Specimen C.—Young, only 1.4 millim. long. Body-spicule exactly as in B, but here I could not find a single one that was nodulous, and no bell-shaped spicules. Pedicel-spicules as in B. Tentacle-spicules: the smaller of these, having to clothe the very minute terminating branches of the tentacle, are much smaller than in A, and the ramifications greatly reduced in size, so that under a usual power of microscope for examination they look like little round or nodulous bodies, and it requires the use of a considerable power ($\frac{2}{3}$ inch and high eyepiece) to reveal their structure.

Specimen A corresponds very closely with Hérouard's figures of the spicules of his "*Semperia Drummondii*," the only slight difference being that the spicules he draws have attained a yet higher degree of calcification, especially shown in figs. 3 and 7, where the foramina are much more contracted in size than in my specimens.

Specimen B corresponds closely with Th. Barrois's figures of his *Cucumaria Lefevrii*, with this curious exception—in his figs. 4 and 5 additional foramina are shown which are built on to the side, so that the number of lateral foramina is increased. In mine a large number of spicules are enlarged beyond the usual four openings, but it is in almost every case in the central line, one at each end, and no tendency whatever is shown to increase laterally.

My specimens were procured for me in 1865 at Polperro by the

old naturalist there, Laughrin, and I also have a mounting of spicules from Belfast corresponding exactly with A.

It is possible that *C. Lacazei*, Hérouard, is also a synonym of *C. Montaguï*; but this could only be the case by supposing that the author has mistaken the position of some of the spicules, and that 4, 12, and 13 belong to the summit of the pedicel, as 6 and 7 do to its sides, and 14 to the centre of the termination.

The specimens B and C, in which I have failed to find the upper dermal bell-shaped spicules, were obtained at the same time and preserved in the same way, in spirits only, as A. I have often failed to find the small upper spicules of other Cucumarians where they ought to have been. How does this happen? Is it that these are the last developed spicules and only occur in adult individuals?

Cucumaria Koellikeri, Semper.

Semper's work is not in my library; Ludvig's reference to it is 'Reise im Arch. der Philippinen-Holothurien,' pp. 237, 271, pl. xxxix. fig. 17. I have, however, many specimens of this species received at different times from the Zoological Station at Naples. The examination of the calcareous deposits in two specimens gives the following results:—

Body-spicule with 3, 4, and up to 8 foramina, but by far the largest number with 4, the others being exceptional. The four-holed spicule differs, however, from that of *C. Montaguï* (specimens A, B, C) in being shorter in proportion to the length. Moreover, these spicules are not only highly nodulous, but the nodules at their summits split, as it were, into little riblets, which riblets ultimately become minutely spinous. This is a peculiarity which I do not remember to have observed in any other spicule of this genus. In the second specimen the body-spicule agrees in character with the last, but those with many foramina are much more numerous, 8 being here very common, and ranging thence up to 18; there is the same tendency of the nodules to break out into spine-points, but less commonly and markedly than in the first specimen.

Upper Body-spicules.—In the first I perhaps see two or three, but am unable to make them out satisfactorily; in the second I cannot find any.

Pedicel-spicules.—The lateral spicules in character like to those of British *C. Montaguï*, but more generally dilated centrally and in that part with the foramina in double line. The spicula of the summit also and those of the tentacles do not exhibit any marked divergence from those of *C. Montaguï*, but the larger of the last more generally with a double row of foramina, at least in their central portion.

I think it is evident that these Naples specimens have been killed with acid, as in the first-mentioned not a single spicule is to be seen in the tentacles, and in the others only the larger forms. This may account for the absence of the second form of body-spicules.

Observations.

It is most likely that when Dr. Marenzeller speaks of *C. Montaguï* as a distinct British species he does so on the authority of specimens which I sent to the Vienna Museum in 1886 as "*Cucumaria Montaguï*, Fleming, Polperro." The specimens sent were taken from the same bottle as those here described, but were probably smaller than A and B (which are the largest I have) but larger than C.

Now the curious circumstance is that *C. Montaguï* seems unquestionably synonymous with *C. Lefevrii*, Th. Barrois, and *Semperia Drummondii*, Hérouard; Marenzeller assigns these names as synonyms of *C. Koellikeri*, while he keeps *C. Montaguï* as a distinct species from *C. Koellikeri*, and refers to *Colochirus Lacazei*, Hérouard, as a synonym. This last I cannot thus recognize as a synonym of *C. Montaguï* unless I am allowed to suppose that Hérouard has mistaken the position of some of the spicules which he figures; moreover, figs. 8 and 18 would be wanting in accuracy, but fig. 11 accurately represents the form and mode of growth of the very minute spicules which I have mentioned as investing the extremities of the tentacles of the specimen C of *C. Montaguï*.

An interesting point has come out in this investigation. It is a circumstance quite new to me that in two specimens of the same species the mode of growth in a spicule should proceed on two entirely different plans. In *C. Montaguï* (B) I have described the two additional foramina made to the original four-holed spicule as almost always being added to the extremities of the spicule; while in *C. Lefevrii*, Th. Barrois (presumably the same species), the drawings show the additional foramina as being added on laterally. In the Naples *C. Koellikeri* the additions to the original spicule appear always to take place laterally (that is, out of the central line), even if added at the extremities it is at the side of the extremity and not apically. In this respect there is agreement with *C. Lefevrii*.

Thyone Portlockii, Forbes.

I believe this species to be another synonym of *C. Montaguï*, for the following reasons:—In 1864 or 1865 I wrote to Belfast, probably—but my memory fails me—to Professor Wyville Thomson, to endeavour to clear up the question what *Holothuria Drummondii*, Thompson, and *Thyone Portlockii*, Forbes, were. As well as I recollect, I learnt that the former was not to be found in the Belfast Museum; but a piece of the skin of the latter was sent to me. Among my collection of Holothuroidean spicules at the present moment is a mounting thus labelled: "*Cucumaria Montaguï*, Fleming, Belfast Museum." Unfortunately there is no further information; but I suspect that a re-examination of the specimen

referred to will prove that my recollection is right. At any rate the mounting referred to agrees absolutely with the specimen here described from Polperro as *C. Montagui* (A).

On the Salivary Apparatus of Birds. By Dr. A.-H. PILLIET.

The system of salivary glands appears to be somewhat slightly developed in birds, and there scarcely exist any comprehensive memoirs upon the subject.

This is due to the difficulty of isolating very small groups of glands buried beneath corneous membranes, of which the dry and apparently unlubricated surface negatives the very idea of a salivary secretion. Milne-Edwards barely devotes a few lines to the matter; these excretory organs, he states, have but little importance, and are only very imperfectly known. The fact is that Duvernoy, Meckel, Müller, Schold, Stannius, Chauveau, and Wiedersheim have only described glands large enough to be isolated by the scalpel—such as the sub-lingual gland of the goose, the palatine glands of the ostrich; the groups of glands of the woodpecker, the parrots, and the climbers; and even the descriptions of these authors convey the impression of isolated and not coordinated facts. Prof. Ranvier in his course of lectures for 1883* returned to the study of these glands, and gave a general description of them, while insisting that the classifications of the old anatomists were fallacious as a natural consequence of their method. As a matter of fact, by analogy with higher animals, parotid, sub-lingual, and submaxillary glands were described in the comparative anatomy of birds. Now, the morphological type represented by the bird, which is very far removed from that of mammals, on the contrary greatly resembles that of the Saurians and Chelonians: and it is with the members of the latter groups, in which the glands of the mouth and pharynx locate themselves where they can, and are spread out and hidden beneath a more or less rigid mucous membrane, that the bird must be compared.

We have studied the salivary glands of birds with respect both to their situation and their structure. The method of examination was as follows: the head was fixed by means of a preservative fluid, decalcified with picric acid supplemented with formic acid, hardened, and cut into slices. These successive manipulations are not without detriment to the study of the cellular substance, but they are of great service in enabling us to make out the situation of the groups of glands; and sections made from strips of excised mucous membrane have rendered it possible for us to give precision to the typographical information afforded by the broad slices.

I. ARRANGEMENT OF THE GLANDS.—a. *The upper jaw.*—In the duck the glands form very abundant groups in the upper jaw, especially at its centre. They do not exist at the base, and the

* L. Ranvier, *Journal de Micrographie*, 1884, p. 146.